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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/781,283

02/13/2001

Pei Reng Jeng

MR1035-820

9464

4586

7590

02/10/2003

ROSENBERG, KLEIN & LEE
3458 ELLICOTT CENTER DRIVE-SUITE 101
ELLICOTT CITY, MD 21043

EXAMINER

ESTRADA, MICHELLE

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 02/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/781,283

Applicant(s)

JENG ET AL.

Examiner

Michelle Estrada

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 November 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 9-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 9-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 and 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Andideh and Ang et al.

Andideh discloses providing a semiconductor substrate already completing the basic process of forming devices 100 such as a field oxide 102, a source, a drain, and a gate thereon (Col. 1, lines 22-24 and Fig. 1d); wherein the gate comprises a tunneling oxide layer, a floating gate, a dielectric layer and a control gate; forming a dielectric layer 103 (BPSG or PSG) used as an inter-layer dielectric on said semiconductor substrate, lapping said dielectric layer by means of a chemical mechanical polishing; and forming an oxide layer 106.

Andideh does not disclose forming a cap layer of high refractive index on said lapped dielectric layer.

Ang et al. disclose semiconductor structure 10 that includes exposed semiconductor devices or interconnect lines 12 which can be comprised of aluminum; forming an ILD 16/18 and chemical-mechanical polishing 18 which can be comprised of FSG or a low K dielectric layer (Col. 3, lines 35-36); and forming a capping layer 20 that

Add Mei et al. to rej.

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may be comprised of silicon nitride, silicon oxynitride or silicon-rich oxide (SRO); wherein said cap layer is a dielectric layer having a refractive index not less than 1.6.

It would have been within the scope of one of ordinary skill in the art to combine the teachings of the references to form the capping layer of Ang et al. on the polished inter-layer dielectric of Andideh to enable formation of an ILD as disclosed by Andideh.

The examiner takes official notice that the use of polysilicon material in floating gates and control gates was known at the time of the applicant's invention. It would have been within the scope of one of ordinary skill in the art to use the known material for its known intended purpose to achieve the formation of the floating and control gates of the combination.

The examiner takes official notice that the use of PECVD silicon oxide layer and tetraethyl-orthosilicate layer to form an inter-metal dielectric was known at the time of the applicant's invention. It would have been within the scope of one of ordinary skill in the art to use the known layers for its known intended purpose to achieve the formation of the inter-metal dielectric layer of the combination.

Response to Arguments

Applicant's arguments filed 10/16/02 have been fully considered but they are not persuasive. Applicant argues that Andideh is not concerned with optical properties of the capping layer, and does not appreciate the fact that such optical properties of the capping layer could improve the compatibility of his structure to subsequent exposition steps or enhanced capability of data retention of the structure. However, it is not

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necessary that the reference discloses the same advantages as the present invention; it is sufficient that the same materials are treated in the same manner.

Applicant argues that similar to Andideh, Ang et al. are not concerned with optical properties of the capping layer 20 and fail to suggest a specific refraction index of the capping layer 20. However, Ang et al. disclose the same materials used in the present invention, therefore the material disclosed in Ang et al. has a refraction index of 1.6.

Applicant argues that the capping layer 20 of Ang et al. is of high thickness ranging from 500-4000 Å, preferably from 1000-3000 Å, and that such a thick capping layer 20 unavoidably is detrimental to further photolithographical process, when needed. However, the thickness range disclosed in Ang et al. overlaps the range disclosed in the present invention, which is 300-2000 Å.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is (703) 308-0729. The examiner can normally be reached on Monday through Friday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.


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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


George Fourson
Primary Examiner
Art Unit 2823


MEstrada
February 5, 2003